Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Herpetofauna, provinces of Chaco and Formosa, Chaco Oriental region, north-eastern Argentina

Blanca Beatriz Álvarez
José Augusto Ruiz García
Jorge Abel Céspedez
Alejandra Beatriz Hernando
Victor Hugo Zaracho
Cinthia Carolina Calamante
Roberto Hugo Aguirre

Universidad Nacional del Nordeste, Facultad de Ciencias Exactas y Naturales y Agrimensura, Laboratorio de Herpetología.
Av. Libertad 5472. CP 3400. Corrientes, Argentina. E-mail: balvarez@exa.unne.edu.ar

Abstract
Oriental Chaco, part of the Great American Chaco, embraces a plain area with soft slopes towards the west-east region. In this region, different kinds of landscapes and vegetation converge, both conditioned by topographical and pluviometric gradients. This region undergoes processes of fragmentation and habitat loss due to intense human activities such as deforestation, agricultural exploitation, construction of a dam, and pollution. In order to contribute to the knowledge of the Oriental Chaco biodiversity, we studied the herpetofauna during one year. We sampled four sites between the coordinates 25° 00' S, 58° 00' W and 27° 00' S, 61° 00' W in the provinces of Chaco and Formosa. Eighty-eight species were registered in the studied places. The higher biodiversity was in grid 46.

Introduction
The Great American Chaco is an ecoregional forest in which the most important value is the existence of the only subtropical dry forest in the planet. It spreads over Brazil, Bolivia, Paraguay, and Argentina and covers 1,066,000 km^2 approximately, 655,000 km^2 of which are located in Argentina (Morello and Matteucci 1999).

In Argentina, the Chaco region spreads over numerous Northern provinces, forming a huge alluvial plain with a soft slope towards the southeast. It presents a wide variety of climates and environments with a high diversity of plants and animals species. According to Morello and Mateucci (1999), there are two fundamental macrounits, considering the weather conditions: wet Oriental Chaco with an annual rainfall varying from 750 to 1200 mm and dry Western Chaco where the annual rainfall ranges from 500 to 750 mm.

Cabrera (1976) recognized four districts to the two already mentioned the Chaco Serrano district to the west and the district of the Savannas to the south. Ledesma (1977) identified four ecoregions from East to West: Wet Chaco, Subhumid Parque Chaqueño, Semi-arid Subhumid Chaco and Dry Semi-arid Chaco.

In Argentina, the Wet or Oriental Chaco embraces approximately 200,000 km^2 extending through the oriental half of the provinces of Chaco and Formosa, northern province of Santa Fe and northwestern province of Corrientes. The abundant annual rainfall (1000–1200 mm) determines a richness of different types of water environments that alternate with drier ones. This allows differentiation among natural environment as forests, grasslands, savannas, palm trees, riparian forests, and low open forest (Guinzburg and Adámoli 2005).

The main tropical trees are *quebracho chaqueño* (*Schinopsis balansae*), white *quebracho* (*Aspidosperma quebracho-blanco*), and white *algarrobo* and black *algarrobo* (*Prosopis alba*,

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

Prosopis nigra, and *Prosopis flexuosa*). In the savannas, *Elionorus muticus* is the dominant species. Unfortunately, for more than one century, this region has been facing serious problems such as the sustained loss of its natural resources because of habitat fragmentation, deforestation, and advance of the agricultural frontier. These activities have strikingly intensified during the last two decades. Decrease in biodiversity because of these impact factors is a matter of concern. These factors affect different types of environments, especially the forest and the savannas of the Oriental Chaco.

The aim of this study is to increase the knowledge of the herpetofaunal diversity of the Oriental Chaco in the provinces of Chaco and Formosa, Argentina. Species richness and comments on rare species and conservation data are presented herein.

Materials and Methods

Study site

Based on the grids of the Herpetological Atlas of Corrientes, Chaco and Formosa in Argentina (Álvarez et al. 2002) we selected four grids in the Oriental Chaco region according to accessibility and environments mosaic. Each grid covers an area of about 50 km by 50 km (Figure 1). The chosen grids are the following 52, 58, 31 and 46 limited by the following geographic coordinates:

- Grid 52 (26º00' S, 60º00' W, 26º30' S, 60º00' W, 26º00' S, 59º30' W, 26º30' S, 59º30' W).
- Grid 58 (26º30' S, 61º00' W, 27º00' S, 61º00' W, 26º30' S, 60º30'00' W, 27º00' S, 60º30'00' W).
- Grid 31 (25º00' S, 60º00' W, 25º30' S, 60º00' W, 25º00' S, 59º30' W, 25º30' S, 59º30' W).
- Grid 46 (25º30'00' S, 58º30' W, 26'00' S, 58º30' W, 25º30'00' S, 58º00' W, 26'00' S, 58º00' W).

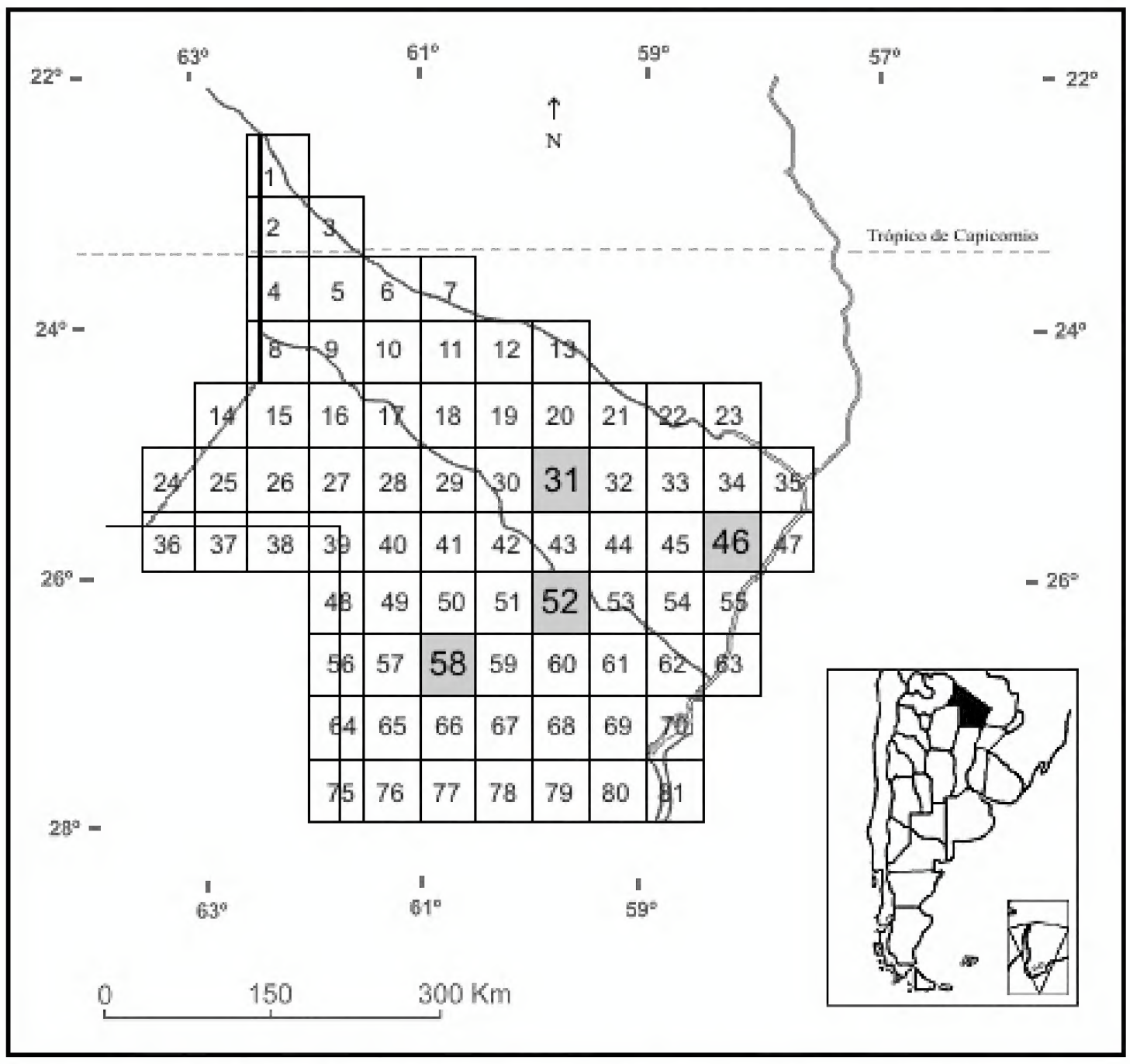

Figure 1. Map showing the localization of grids surveyed in the Oriental Chaco located in the provinces of Chaco (52 and 58) and Formosa (31 and 46).

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Data collection

Field methods included a combination of techniques based on Heyer et al. (1994): species inventory through time limited sampling and survey through visual and auditory encounter transects traced inside each grid. Specimens were identified using available keys (Cei 1980; 1993; Giraudo 2001) and deposited at the *Colección Herpetológica, Universidad Nacional del Nordeste*, Corrientes, Argentina (UNNEC).

Result and Discussion

A total of 33 amphibian species and 55 reptile species were recorded. Grid 46 had the highest species richness of amphibians and reptiles (75 species), these represents the 88 % and 79 % of recorded taxa, respectively. These data are significant considering the grade of anthropic modification in this grid due to livestock breeding and agricultural as well as forest exploitation. In the remaining grids, field records were as follow: grid 58 with 57 species, grid 52 with 50 species and grid 31 with 47 species.

The amphibian species belong to one order, seven families and sixteen genera. The family with the largest number of species was Hylidae (11 species), followed by Leptodactylidae (8 species), Bufonidae (5 species), Leiuperidae (4 species), Ceratophryidae and Microhylidae (2 species each) and Cycloramphidae (1 species) (Table 1, Figure 2 A-F).

The reptile species belong in three orders, seventeen families, and forty genera (Appendix 1). Colubridae was the richest taxon, comprising 24 species followed by Amphisbaenidae and Teiidae (5 species each), Chelidae, Alligatoridae, Tropiduridae, Scincidae, Boidae, Elapidae and Viperidae (2 species each), Testudinidae, Anguidae, Gymnophthalmidae, Polychrotidae, Typhlopidae and Leptotyphlopidae (1 species each) (Appendix 1, Figure 3 A-F). We also registered the introduced species *Hemidactylus mabouia* (Gekkonidae).

The amphibians and reptiles recorded represent 60 % of the previously cited species by Álvarez et al. (2002) for the Oriental Chaco in north-eastern Argentina.

Considering the conservation status and according to Lavilla et al. (2000), we found one species in "danger of extinction": the Chaco Side-necked Turtle *Acanthochelys pallidipectoris* (Figure 4 A) and one "threatened" species: the Argentine Constrictor Boa *Boa constrictor occidentalis* (Figure 4 B). It is important to remark that the latter species was recorded in areas with forest exploitation activities and high agricultural development of the province of Chaco. The yellow anaconda or *curiyú*, *Eunectes noteaus* (Figure 4 C), *Polychrus acutirostris* (Figure 4 D), and the caimans *Caiman latirostris* and *Caiman yacare* are "vulnerable" species while *Leptodactylus diptyx*, *Elachistocleis bicolor*, *Leposternon microcephalum* and *Kentropyx viridistriga* are "insufficiently known" species (Lavilla et al. 2000). All amphibian species recorded are currently categorized as Least Concern (LC) according to IUCN Red List.

Because of the over-exploitation of forest resources, advance of the agricultural boundary, and construction of engineering works in the Oriental Chaco, environmental policies for the conservation of the last pristine environment in South America need to be implemented soon. This region is threatened due to the absence of policies that consider the dynamics of the ecosystems (Adámoli et al. 2004).

Literature cited

Adámoli, J., R. Ginzburg, S. Torrella, and P. Herrera. 2004. Expansión de la frontera agrícola en la región chaqueña: el ordenamiento territorial como herramienta para la sustentabilidad. Gerencia ambiental 11(112): 810-823.

Álvarez, B. B., R. H. Aguirre, J. A. Céspedez, A. Hernando, E. Tedesco, and O. Orfeo. 2002. Atlas de Anfibios y Reptiles de las Provincias de Corrientes, Chaco y Formosa (Argentina) I (Anuros, Cecílidos, Saurios, Anfisbénidos y Serpientes). Buenos Aires: EUDENE (Universidad Nacional del Nordeste). 160 p.

Cabrera, A. L. 1976. Regiones Fitogeográficas Argentinas. Enciclopedia Argentina de Agricultura y

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Jardinería. Buenos Aires: Editorial ACME, Tomo 2: 1-85.

Cei, J. M. 1980. Amphibians of Argentina. Monografía 2. Firenze: Monitore Zoologico Italiano. 609 p.

Cei, J. M. 1993. Reptiles del noroeste, nordeste y este de Argentina. Herpetofauna de las Selvas Subtropicales, Puna y Pampas. Monografía XIV. Torino: Museo Regionale di Scienze Naturali Bollettino. 949 p.

Giraudo, A. R. 2001. Serpientes de la Selva Paranaense y del Chaco Húmedo. Buenos Aires: L.O.L.A. 328 p.

Ginzburg, R. and J. Adámoli. 2005. Situación ambiental en el Chaco Húmedo; p. 103-129 *In* A. Brown, U. Martinez Ortiz, M. Acerbi and J. Corchera (ed), La Situación ambiental Argentina. Buenos Aires: Fundación Vida Silvestre.

Heyer, W. R., M. A. Donnelly, R. W. Mc Diarmind, L. A. C. Hayek, and M. S. Foster. 1994. Mesuring and Monitoring Biological Diversity. Standard Methods for Amphibians. Washington, D.C.: Smithsonian institution press. 364 p.

IUCN, Conservation International and NatureServe.2008. Global Amphibian Assessment. Eletronic database accessible at http://www.globalamphibians.org. Captured on 15 Oct 2008.

Lavilla, E., E. Richard, and G. Scrocchi. 2000. Categorización de Anfibios y Reptiles de la República Argentina. Buenos Aires: Asociación Herpetológica Argentina. 97 p.

Ledesma, N. R. 1977. Zonificación de la economía agropecuaria y forestal, región chaqueña. Ciencia e Investigación 33: 134-145.

Morello, J. and S. D. Matteucci. 1999. Biodiversidad y fragmentación de los bosques en la Argentina; p. 463-498 *In* S. D. Matteucci, O. T. Solbrig, J. Morillo, and G. Halffter (ed), Biodiversidad y uso de la Tierra Conceptos y ejemplos de Latinoamérica. Buenos Aires: Eudeba.

Received May 2008
Accepted November 2008
Published online March 2009

Appendix 1. List of amphibians and reptiles from Chaco Oriental. References: SC: Status Conservation, T: Threatened, IK: Insufficiently Known, I: Introduced, NT: Not Threatened, DE: Danger of extinction, V: Vulnerable.

		Grid				
CLASS		Chaco		Formosa		SC
ORDER / FAMILY	SPECIES	52	58	31	46	
AMPHIBIA						
ANURA						
Bufonidae	*Rhinella bergi* (Céspedez, 2000)	X	X	X	X	NT
	Rhinella fernandezae (Gallardo, 1957)	X	X	X	X	NT
	Rhinella granulosa (Müller & Hellmich, 1937)	X	X	X	X	NT
	Rhinella schneideri (Werner, 1894)	X	X	X	X	NT
	Melanophryniscus klappenbachi Prigioni & Langone, 2000	X			X	NT
Ceratophryidae	*Ceratophrys cranwelli* Barrio, 1980	X	X		X	NT
	Lepidobatrachus llanensis Reig & Cei, 1963				X	NT
Cycloramphidae	*Odontophrynus americanus* (Duméril & Bibrón, 1841)	X	X	X	X	NT
Hylidae	*Dendropsophus nanus* (Boulenger, 1889)	X	X	X	X	NT
	Hypsiboas raniceps (Cope, 1862)	X	X	X	X	NT
	Phyllomedusa azurea (Cope, 1862)	X	X	X	X	NT
	Phyllomedusa sauvagii Boulenger, 1882	X	X			NT
	Pseudis limellus (Cope, 1862)		X		X	NT
	Pseudis paradoxus Gallardo, 1961		X	X	X	NT
	Scinax acuminatus (Cope, 1862)	X	X	X	X	NT

LISTS OF SPECIES

ORDER / FAMILY	SPECIES	52	58	31	46	
Hylidae	*Scinax nasicus* (Cope, 1862)	X	X	X		NT
	Scinax squalirostris (Lutz, 1925)				X	NT
	Scinax fuscomarginatus (Lutz, 1925)		X		X	NT
	Trachycephalus venulosus (Laurenti, 1768)	X	X	X	X	NT
Leptodactylidae	*Leptodactylus bufonius* Boulenger, 1894		X	X	X	NT
	Leptodactylus chaquensis Cei, 1950	X	X	X	X	NT
	Leptodactylus diptyx (Boettger, 1885)		X	X	X	IK
	Leptodactylus elenae Heyer, 1978	X	X	X	X	NT
	Leptodactylus fuscus (Schneider, 1799)	X	X	X	X	NT
	Leptodactylus latinasus Jiménez de la Espada, 1875	X	X	X	X	NT
	Leptodactylus mystacinus (Burmeister, 1861)	X	X		X	NT
	Leptodactylus podicipinus (Cope, 1862)	X	X	X	X	NT
Leiuperidae	*Physalaemus albonotatus* (Steindachner, 1862)	X	X	X	X	NT
	Physalaemus biligonigerus (Cope, 1860)	X	X	X	X	NT
	Pseudopaludicola falcipes (Hensel, 1867)	X	X			NT
	Pseudopaludicola boliviana Parker, 1927			X	X	NT
Microhylidae	*Dermatonotus muelleri* (Boettger, 1885)	X	X	X	X	NT
	Elachistocleis bicolor (Valenciennes, 1838)	X			X	IK
REPTILIA						
TESTUDINES						
Chelidae	*Acanthochelys pallidipectoris* (Freiberg, 1945)	X				DE
	Phrynops hilarii (Duméril & Bibrón, 1835)	X			X	NT
Testudinidae	*Chelonoidis chilensis* (Gray, 1870)	X				T
CROCODYLIA						
Alligatoridae	*Caiman latirostris* (Daudin, 1802)				X	V
	Caiman yacare (Daudin, 1802)				X	V
SQUAMATA						
Amphisbaenidae	*Amphisbaena heterozonata* Burmeister, 1861		X			NT
	Amphisbaena bolivica Mertens, 1929		X	X	X	NT
	Amphisbaena mertensi Strauch, 1881				X	NT
	Anops kingi Bell, 1833		X			NT
	Leposternon microcephalum Wagler, 1824	X	X	X	X	IK
Anguidae	*Ophiodes intermedius* Boulenger, 1894	X	X	X	X	NT
Gekkonidae	*Hemidactylus mabouia* Moreau de Jonnès, 1818				X	I
Gymnophthalmidae	*Cercosaura schreibersii* Wiegmann,1834		X		X	NT
Polichrotidae	*Polychrus acutirostris* Spix, 1825				X	V
Scincidae	*Mabuya frenata* (Cope, 1862)	X	X	X	X	NT
	Mabuya dorsivittata Cope, 1862	X		X	X	NT
Teiidae	*Ameiva ameiva* (Linnaeus, 1758)	X	X	X	X	NT

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

ORDER / FAMILY	SPECIES	52	58	31	46	
Teiidae	*Teius teyou* (Daudin, 1802)	X	X	X	X	NT
	Teius oculatus (D´Orbigny & Bibrón, 1837)	X	X		X	NT
	Tupinambis merianae (Duméril & Bibrón, 1839)				X	NT
	Kentropyx viridistriga (Boulenger, 1894)				X	IK
Tropiduridae	*Tropidurus spinulosus* (Cope, 1862)	X			X	NT
	Tropidurus torquatus (Wied, 1820)				X	NT
Typhlopidae	*Typhlops brongersmianus* Vanzolini, 1972	X	X	X	X	NT
Leptotyphlopidae	*Leptotyphlops albipunctus* (Burmeister, 1861)		X			NT
Boidae	*Boa constrictor occidentalis* Philippi, 1873	X	X	X	X	T
	Eunectes notaeus Cope, 1862	X			X	V
Colubridae	*Boiruna maculata* (Boulenger, 1896)		X		X	NT
	Chrinonius quadricarinatus Dixon,Wiest & Cei, 1993			X	X	NT
	Clelia bicolor (Peracca, 1904)	X	X	X	X	NT
	Echinanthera occipitalis (Jan, 1863)				X	NT
	Helicops leopardinus (Schlegel, 1837)	X		X	X	NT
	Hydrodynastes gigas (Duméril, Bibrón & Duméril, 1854)	X		X	X	NT
	Leptodeira annulata pulchriceps Duellman, 1958	X		X	X	NT
	Leptophis ahaetulla marginatus (Cope, 1862)	X	X		X	NT
	Liophis almadensis (Wagler, 1824)		X	X		NT
	Liophis dilepis (Cope, 1862)	X		X	X	NT
	Liophis guentheri Peracca, 1897	X	X	X	X	NT
	Liophis poecilogyrus caesius (Cope, 1862)		X	X	X	NT
	Lystrophis dorbignyi (Duméril, Bibrón & Duméril, 1854)				X	NT
	Lystrophis pulcher (Jan, 1863)		X			NT
	Mastigodryas bifossatus (Raddi, 1820)				X	NT
	Oxyrhopus rhombifer rhombifer (Duméril, Bibrón & Duméril, 1854)				X	NT
	Philodryas aestivus Boulenger, 1902				X	NT
	Philodryas mattogrossensis Koslowsky, 1898		X	X		NT
	Philodryas patagoniensis (Girard, 1857)	X	X	X	X	NT
	Phimophis vittatus (Boulenger, 1896)	X	X	X	X	NT
	Sibynomorphus turgidus (Cope, 1862)		X			NT
	Thamnodynastes chaquensis Bergna & Álvarez, 1993		X		X	NT
	Thamnodynastes hypoconia Cope, 1863		X	X	X	NT
	Waglerophis merremii (Wagler, 1824)	X	X	X	X	NT
Elapidae	*Micrurus baliocoryphus* (Cope, 1862)	X				NT
	Micrurus pyrrhocryptus (Cope, 1862)		X		X	NT
Viperidae	*Bothrops alternatus* Duméril, Bibrón & Duméril, 1854				X	NT
	Bothrops diporus Cope, 1862		X	X	X	NT

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Figure 2. Representatives of some of the amphibians recorded at the Oriental Chaco: A) *Odontophrynus americanus*; B) *Hypsiboas raniceps*; C) *Melanophryniscus klappenbachi*; D) *Elachistocleis bicolor*; E) *Trachycephalus venulosus*; F) *Phyllomedusa azurea.* Photos by V. H. Zaracho.

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Figure 3. Representatives of some of the reptiles recorded at the Oriental Chaco: A) *Liophis guentheri* (photo by C. C. Calamante); B) *Clelia bicolor* (photo by C. C. Calamante); C) *Phimophis vittatus* (photo by V. H. Zaracho); D) *Echinanthera occipitalis* (photo by C. C. Calamante); E) *Teius teyou* (photo by V. H. Zaracho); F) *Ameiva ameiva* (photo by C. C. Calamante).

Check List **5**(1): 074–082, 2009
ISSN: 1809-127X

LISTS OF SPECIES

Figure 4. Species of reptiles which should be protected: A) *Acanthochelys pallidipectoris* (photo by L. M. Paszko); B) *Eunectes noteaus*; (photo by C. C. Calamante); C) *Boa constrictor occidentalis* (photo by J. A. Ruiz García); D) *Polychrus acutirostris* (photo by V. H. Zaracho).